WEIR RIVER BASIN
HINGHAM, MASSACHUSETTS

ACCORD POND DAM
MA 00430

PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM

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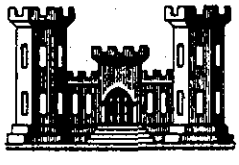

DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION, CORPS OF ENGINEERS
WALTHAM, MASS. 02154

APRIL 1979

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Hingham, Massachusetts
Accord Brook-Tributary of the Weir River

20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

Accord Pond Dam is a 300 foot long, 8.5 foot high earthfill dam. The pond is a water supply reservoir for the Town of Hingham. There are deficiencies which must ve corrected to assure the continued satisifactory performance of this dam. It is generally in fair condition. The dam is small in size and has a hazard potential of significant. It is recommended that the owner employ the services of a qualified consultant to evaluate the seepage at the toe of the east embankment and in the downstream channel.

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DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION, CORPS OF ENGINEERS
424 TRAPELO ROAD
WALTHAM, MASSACHUSETTS 02154

REPLY TO
ATTENTION OF:
NEDED

JUN 25 1979

Honorable Edward J. King
Governor of the Commonwealth of
Massachusetts
State House
Boston, Massachusetts 02133

Dear Governor King:

I am forwarding to you a copy of the Accord Pond Dam Phase I Inspection Report, which was prepared under the National Program for Inspection of Non-Federal Dams. This report is presented for your use and is based upon a visual inspection, a review of the past performance and a brief hydrological study of the dam. A brief assessment is included at the beginning of the report. I have approved the report and support the findings and recommendations described in Section 7 and ask that you keep me informed of the actions taken to implement them. This follow-up action is a vitally important part of this program.

A copy of this report has been forwarded to the Department of Environmental Quality Engineering, the cooperating agency for the Commonwealth of Massachusetts. In addition, a copy of the report has also been furnished the owner, Hingham Water Company, 28 South Street, Hingham, Massachusetts 02043.

Copies of this report will be made available to the public, upon request, by this office under the Freedom of Information Act. In the case of this report the release date will be thirty days from the date of this letter.

I wish to take this opportunity to thank you and the Department of Environmental Quality Engineering for your cooperation in carrying out this program.

Sincerely yours,

JOHN P. CHANDLER
Colonel, Corps of Engineers
Division Engineer

Incl
As stated

ACCORD POND DAM

MA 00430

WEIR RIVER BASIN
HINGHAM, MASSACHUSETTS

PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION
PROGRAM

NATIONAL DAM INSPECTION
PROGRAM

PHASE I INSPECTION REPORT

BRIEF ASSESSMENT

Identification No.: MA00430

Name of Dam: Accord Pond

Town: Hingham

County and State: Plymouth County, Massachusetts

Stream: Accord Brook - Tributary of the Weir River

Date of Inspection: December 8, 1978

Accord Pond Dam is a 300-foot long, 8.5-foot high earthfill dam built in the early 1890's. The pond is a water supply reservoir for the Town of Hingham. The crest of the dam varies from elevation (El) 140.5 to 142.4. The spillway is located approximately 200 feet from the east abutment. The spillway crest is 6.6 feet long, with a crest elevation of 139.0. The concrete crest is curved, and mounted with wooden stoplogs to El 139.9. The downstream face is sloped and made of concrete and stone masonry. A concrete slab covers the spillway from 12 feet upstream of the crest to 17.8 feet downstream. The spillway leads to an 8-foot wide rectangular discharge channel. The channel is 90 feet long and leads to a natural streambed.

The main outlet at the dam is a 16-inch diameter, cast-iron pipe which leads from the bottom of the pond to a gate house at the downstream toe of the dam. The invert of the pipe is unknown. The outlet, which divides into two 14-inch lines at the gate house, leads to a 16-inch pipeline downstream and eventually to a water treatment plant. A second outlet, 10 inches in diameter, is located adjacent to the spillway. Water is pumped through the 10-inch outlet from a pumping station on the bank of the spillway channel and is transferred to the water treatment plant. A third outlet, which is an 8-inch, cast-iron pipe, is located about 600 feet east of the spillway. Water is pumped through this pipeline to a standpipe on an adjacent hill.

There are deficiencies which must be corrected to assure the continued satisfactory performance of this dam. This conclusion is based upon the visual inspection at the site, the available engineering data, and limited evidence of operational and maintenance procedures. Generally, the dam is in fair condition.

The following deficiencies were noted at the site: seepage from the toe of the east embankment and from the east wall and floor of the downstream channel, eroded and sloughed areas on the crest and slopes of the embankment, insufficient riprap along the upstream slope of the east embankment, lack of riprap on the west embankment, growth of trees and brush on the upstream and downstream slopes of the dam and in the floor of the downstream channel, dislodged stone rubble at the toe of the spillway apron, a constriction within the spillway structure, and an accumulation of rock and other debris in the spillway and downstream channel.

Based on Corps of Engineers guidelines, the dam has been classified as "small" and in the "significant" hazard category. Accordingly, a test flood equal to one-quarter the probable maximum flood (PMF) was used for the hydraulic analysis of the spillway. The analyses indicate that the spillway with the stoplogs in place can discharge a flow of 10.6 cubic feet per second (cfs) with the water surface at El 140.5, which is the low point on the crest of the dam. An outflow test flood of 140 cfs would overtop the dam to El 141.4. The spillway with stoplogs will therefore discharge appproximately 8 percent of the test flood.

Without the stoplogs, the spillway could discharge 42.5 cfs. Under these conditions, the test flood outflow would be reduced to 84 cfs, and would overtop the dam to El 141.0. The spillway without stoplogs would discharge 50 percent of the outflow.

It is recommended that the owner employ the services of a qualified consultant to evaluate the seepage at the toe of the east embankment and in the downstream channel. Furthermore, the constriction in the spillway channel should be evaluated to determine the impact on restriction of flow. The Owner should also accomplish the following: place fill in the area west of the spillway, presently the low point in the crest of the dam at El 140.5, to bring the elevation up to 141.7, the elevation of the dam east of the spillway; repair

erosion and sloughing at various locations on the embankment; place additional riprap along the upstream slope of the east embankment; replace riprap on the upstream slope of the west embankment; selectively clear trees and remove all brush from the upstream and downstream slopes of the dam and from the bed of the downstream channel; repair and replace dislodged stone rubble at the toe of the spillway apron; and remove rock and other debris from the spillway and downstream channel. The Owner should also implement a more systematic program of inspection and maintenance, as outlined in Section 7.

The above recommendations and remedial measures outlined above and in Section 7 should be implemented by the Owner within a period of one year after receipt of this Phase I Inspection Report.

Edward M. Greco, P.E.
Project Manager
Metcalf & Eddy, Inc.

Connecticut Registration
No. 08365

Approved by:

Stephen L. Bishop, P.E.
Vice President
Metcalf & Eddy, Inc.

Massachusetts Registration
No. 19703

This Phase I Inspection Report on Accord Pond Dam has been reviewed by the undersigned Review Board members. In our opinion, the reported findings, conclusions, and recommendations are consistent with the Recommended Guidelines for Safety Inspection of Dams, and with good engineering judgment and practice, and is hereby submitted for approval.

Joseph W. Finegan

JOSEPH W. FINEGAN, JR., MEMBER
Water Control Branch
Engineering Division

Joseph A. McElroy

JOSEPH A. MCELROY, MEMBER
Foundation & Materials Branch
Engineering Division

Carney M. Terzian

CARNEY M. TERZIAN, CHAIRMAN
Chief, Structural Section
Design Branch
Engineering Division

APPROVAL RECOMMENDED:

Joe B. Fryar

JOE B. FRYAR
Chief, Engineering Division

PREFACE

This report is prepared under guidance contained in Recommended Guidelines for Safety Inspection of Dams, for a Phase I Investigation. Copies of these guidelines may be obtained from the Office of Chief of Engineers, Washington, D.C. 20314. The purpose of a Phase I Investigation is to identify expeditiously those dams which may pose hazards to human life or property. The assessment of the general condition of the dam is based upon available data and visual inspections. Detailed investigations, and analyses involving topographic mapping, subsurface investigations, testing, and detailed computational evaluations are beyond the scope of a Phase I investigation; however, the investigation is intended to identify any need for such studies.

In reviewing this report, it should be realized that the reported condition of the dam is based on observations of field conditions at the time of inspection along with data available to the inspection team. In cases where the reservoir was lowered or drained prior to inspection, such action, while improving the stability and safety of the dam, removes the normal load on the structure and may obscure certain conditions which might otherwise be detectable if inspected under the normal operating environment of the structure.

It is important to note that the condition of a dam depends on numerous and constantly changing internal and external conditions, and is evolutionary in nature. It would be incorrect to assume that the present condition of the dam will continue to represent the condition of the dam at some point in the future. Only through continued care and inspection can there be any chance that unsafe conditions will be detected.

Phase I inspections are not intended to provide detailed hydrologic and hydraulic analyses. In accordance with the established Guidelines, the Spillway Test Flood is based on the estimated "Probable Maximum Flood" for the region (greatest reasonably possible storm runoff), or fractions thereof. Because of the magnitude and rarity of such a storm event, a finding that a spillway will not pass the test flood should not be interpreted as necessarily posing a highly inadequate condition. The test flood provides a measure of relative spillway capacity and serves as an aid in determining the need for more detailed hydrologic and hydraulic studies, considering the size of the dam, its general conditions and the downstream damage potential.

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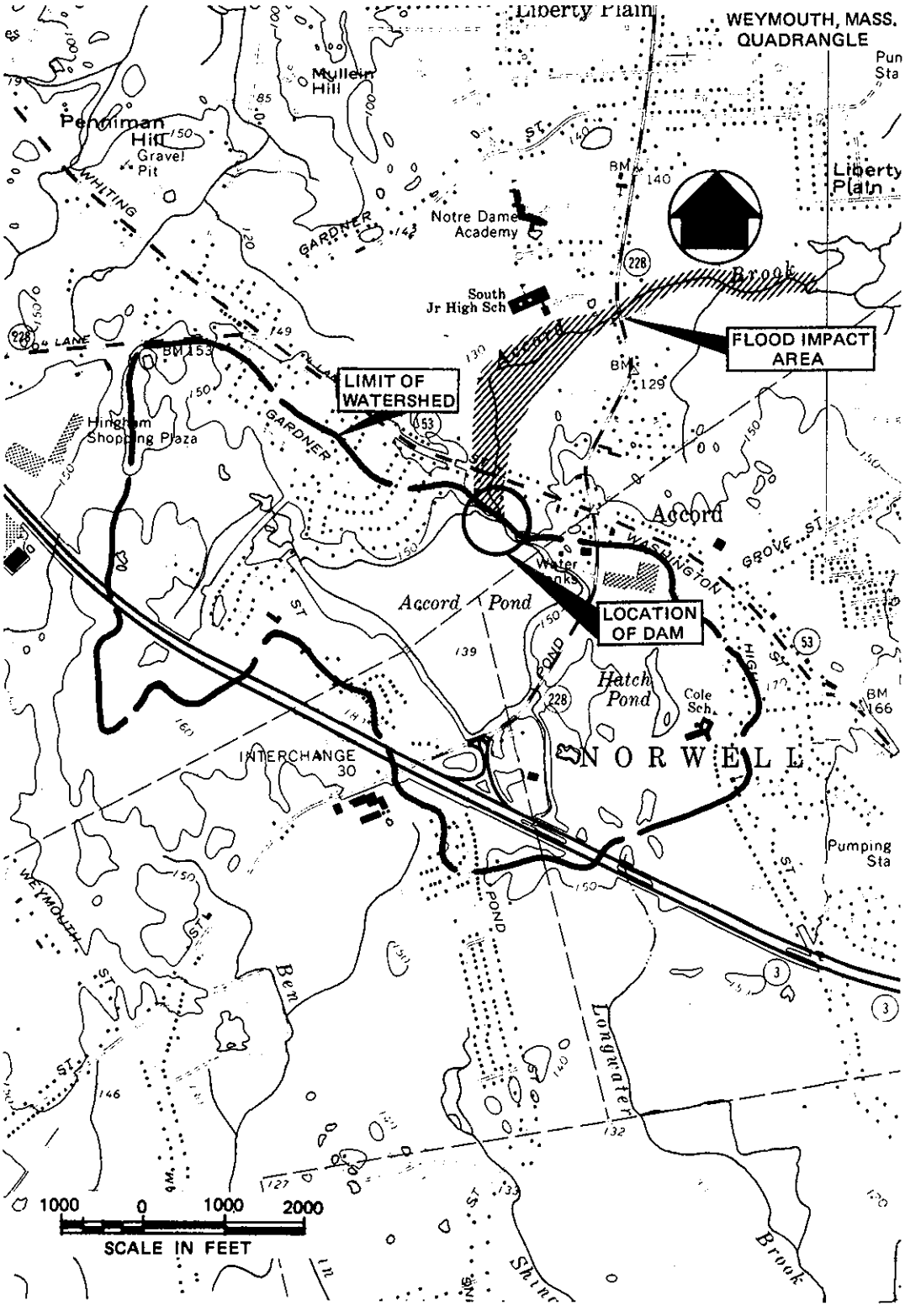


LOCATION MAP – ACCORD POND DAM

NATIONAL DAM INSPECTION
PROGRAM

PHASE I INSPECTION REPORT

ACCORD POND DAM

SECTION 1

PROJECT INFORMATION

1.1 General

a. Authority. Public Law 92-367, dated August 8, 1972, authorized the Secretary of the Army, through the Corps of Engineers, to initiate a national program of dam inspection throughout the United States. The New England Divison of the Corps of Engineers has been assigned the responsibility of supervising the inspection of dams within the New England Region. Metcalf & Eddy, Inc. has been retained by the New England Division to inspect and report on selected dams in the State of Massachusetts. Contract No. DACW 33-79-C-0016, dated November 28, 1978, has been assigned by the Corps of Engineers for this work.

b. Purpose:

(1) Perform technical inspection and evaluation of non-Federal dams to identify conditions which threaten the public safety and thus permit correction in a timely manner by non-Federal interests.

(2) Encourage and assist the States to initiate quickly effective dam safety programs for non-Federal dams.

(3) Update, verify and complete the National Inventory of Dams.

1.2 Description of Project

a. Location. The dam is located on Accord Brook which is a tributary of the Weir River in the

Town of Hingham, Plymouth County, Massachusetts (see location map).

b. Description of Dam and Appurtenances. Accord Pond Dam is an earthfill dam 300 feet long and 8.5 feet high (see Figures B-1 and B-2). The crest of the dam is 10 to 11 feet wide and varies from El 140.5 to El 142.4. East of the spillway, the crest of the dam is covered with grass. The upstream face of the east embankment slopes at 6:1 (horizontal:vertical). There is also a 3.5-foot high, nearly vertical, concrete and masonry protective wall at the top of the slope for a distance of about 110 feet east from the spillway. The remaining slope is covered with riprap. The downstream face slopes at 2:1 and is covered with grass. West of the spillway, the crest of the dam is an earth access road. The upstream face of the west embankment slopes at 2:1 and is covered with loose stone. The downstream face has been filled in for the roadway. The east and west embankments tie into natural ground at the abutments.

The spillway is constructed of mortared stone sidewalls which support two reinforced concrete cover slabs. A hinged iron hatch provides access through the upstream slab to wooden stoplogs mounted on the crest of the spillway. The crest is 6.6 feet long and is at El 139.0. The top of the stoplogs is at El 139.9. This leaves a 0.6-foot high opening between the top of the stoplogs and the bottom of the concrete slab. The crest is curved and made of concrete. The downstream face is sloped and constructed with concrete near the top and mortared stone near the bottom. The spillway leads to an 8-foot wide, 90-foot long, rectangular discharge channel. The floor of the channel is lined with stone, and the walls are mortared stone masonry. The man-made channel leads from the spillway to a natural streambed.

The pond is used for water supply and has three outlets. The main outlet is located about 40 feet east of the spillway. This is a 16-inch cast-iron pipe which flows by gravity to a gate house at the toe of the dam. Inside the gate

house are screens and a small chlorination unit. Water leaves the gate house via two 14-inch lines which lead to a 16-inch line and eventually to an off-site water treatment plant. There is also a bypass to the discharge channel from the gate house. A second lower level outlet consists of a 10-inch cast-iron pipe located adjacent to the east wall of the spillway. Partial drawdown can be accomplished by use of the gravity feed 16-inch C.I. pipe. This outlet discharges to the treatment plant. The third outlet is an 8-inch, cast-iron suction line connected to a pumping station. Water pumped through the pipe discharges into a stand pipe located about 600 feet east of the spillway. There are no elevations available for the inverts of these pipelines. The inlets are on the bottom of the pond. As shown in Figure B-1, there is a 12-inch, cast-iron pipe protruding from the upstream slope of the embankment 30 feet south of the spillway. The function of this pipe is unknown.

c. Size Classification. Accord Pond Dam is classified in the "small" category since it has a maximum height of about 8.5 feet and a maximum storage capacity of 985 acre-feet. However, the outlet pipes for the water supply system are located at an elevation below the toe of the dam. Therefore, the usable storage is 845 acre-feet which exceeds the storage volume that could drain from the pond in the event of failure of the dam.

d. Hazard Classification. The area downstream of the dam is a sparsely developed and moderately wooded for a distance of approximately 500 feet. Beyond the wooded area is a restaurant, and Route 53, a four-lane highway which runs east-west and is developed commercially. Two schools are also located 3,000 feet downstream. Storms which have occurred in previous years did not create problems with either flooding, overtopping or washouts.

In the event of failure of the dam, appreciable property damage might occur. It is unlikely that any lives would be lost. Accordingly, the

dam is placed in the "significant" hazard category.

e. Ownership. The dam is owned by the Hingham Water Company, 28 South Street, Hingham, Massachusetts 02043 (telephone: 617-749-0801). Mr. James Cypher granted permission to enter the property and inspect the dam.

f. Operators. The dam and associated structures are operated by the Hingham Water Company. Spillway discharge is controlled with stoplogs. Use of a pond as a water supply determines the operating procedure for the intakes, which discharge by gravity to the water treatment plant.

g. Purpose of the Dam. Water is stored in the reservoir for use as water supply for the Town of Hingham. The present reservoir capacity is 1535 acre-feet (500 million gallons). However, only 845 acre-feet (275 million gallons) of this water is usable storage because of the elevation of the outlets.

h. Design and Construction History. There is no information available relative to the design and construction of this dam, which was built in the early 1890's.

The Owner reports that in 1977 waves had caused erosion of the upper portion of the upstream slope of the dam, east of the spillway. To protect the embankment, the Owner constructed a 3.5-foot high, nearly vertical stone masonry wall along the top of the upstream slope, beginning at the spillway, easterly for a distance of about 110 feet. No other information is available on repairs made to the dam.

i. Normal Operating Procedures. Under normal conditions, water from Accord Pond is utilized only during the summer months. The remainder of the time, water is obtained from groundwater supplies. Personnel from the Hingham Water Company visit the gate house on a daily basis all year. The procedure in the summer is to clean the screens and check the flow of water. In the winter, the gate valves are left

slightly open to maintain flow in the system. The water is chlorinated at all times.

A staff gage located at the spillway is read weekly and more often during periods of heavy rainfall.

1.3 Pertinent Data

a. Drainage Area. The drainage area is approximately 642-acres (1.01 square miles) and includes the drainage to Hatch Pond, located about 0.5 miles southeast of the dam. The drainage area is sparsely developed and wooded to the southeast and is well developed and wooded to the northwest. There is moderate residential development around the pond.

b. Discharge. Normal discharge is over the spillway which is provided with stoplogs. The spillway is 6.6 feet long with a crest at El 139.0. The top of the stoplogs is at El 139.9. Water flows down a 7.2-foot high, curved concrete surface and into a stone-lined, rectangular discharge channel. The channel is 8 feet wide and extends 90 feet downstream, where it discharges into a natural streambed. The stream flows under Route 53 (Whiting Road) through a 48-inch reinforced concrete culvert.

The spillway (without stoplogs) can discharge an estimated 42.5 cfs with the water surface at El 140.5. This is the low point on the crest of the dam. The outflow test flood (one-quarter PMF) of 84 cfs at pond El 141.0 will overtop the dam. Under these conditions, the spillway can discharge 50 percent of the test flood without overtopping the dam. The maximum flood level at the dam is unknown. Personnel at the Hingham Water Company report that the dam has never been overtopped.

c. Elevation (Feet above Mean Sea Level (MSL)). A benchmark was established at El 139.0 on the crest of the spillway. This elevation is shown on the U.S. Geological Survey topographic map.

(1) Top dam: 140.5 to 142.4

(2) Test flood pool: 141.0

(3) Design surcharge: Unknown

(4) Full flood control pool: Not Applicable (N/A)

(5) Recreation pool: N/A

(6) Spillway crest (without stoplogs): 139.0

(7) Upstream portal invert diversion tunnel: N/A

(8) Streambed at centerline of dam: 132.0

(9) Maximum tailwater: N/A

d. Reservoir

(1) Length of maximum pool: 2,500 feet

(2) Length of recreation pool: N/A

(3) Length of flood control pool:N/A

e. Storage (acre-feet)

(1) Test flood surcharge: 191 (net) at El 141.0

(2) Top of dam: 985

(3) Flood control pool: N/A

(4) Recreation pool: N/A

(5) Spillway crest: Usable storage 845

f. Reservoir Surface (acres)

*(1) Top dam: 95.5

*(2) Test flood pool: 95.5

(3) Flood control pool: N/A

*Based on the assumption that the surface area will not increase significantly with changes in reservoir elevation from 139.0 to 141.0.

(4) Recreation pool: N/A

(5) Spillway crest: 95.5

g. Dam

(1) Type: earthfill

(2) Length: 300 feet

(3) Height: 8.5 feet

(4) Top width: varies from 10 to 11 feet

(5) Side slopes: upstream 6:1 to vertical (east embankment), 2:1 (west embankment) downstream - 2:1 (east embankment)

(6) Zoning: Unknown

(7) Impervious core: Unknown

(8) Cutoff: Unknown

(9) Grout curtain: Unknown

i. Spillway

(1) Type: Rounded crest with stop logs

(2) Length of weir: 6.6 feet

(3) Crest elevation 139.0 MSL (assumed benchmark) without stoplogs

(4) Gates: None, stoplogs in place

(5) Upstream channel: None

(6) Downstream channel: Stone-lined, rectangular channel, 8 feet wide and 90 feet long, leads to natural streambed.

(7) General: 48-inch diameter reinforced concrete culvert under Whiting Road approximately 500 feet downstream

j. Regulating Outlets. The main regulating outlet at the dam is a 16-inch diameter, cast-iron

pipe located about 40 feet east of the spillway. The invert elevation is not known. The pipe leads from the bottom of the pond to a gate house at the toe of the dam. At the gate house, the pipe divides into two 14-inch diameter, cast-iron lines which lead to a single 16-inch line and eventually to the water treatment plant. A bypass also leads from the gate house to the discharge channel below the spillway. Flow through the outlet is controlled by valves in the gate house.

A second outlet, which is 10-inch diameter cast-iron pipe, is located just east of the spillway at a lower level. Water is pumped through this line from a pumping station located at the toe of the dam, next to the spillway channel. The pipeline supplies the water treatment plant.

A third outlet is an 8-inch diameter, cast-iron pipe which is located about 600 feet east of the spillway. This outlet is the suction line to the pumping station at the toe of the dam, which can pump from the pond to a standpipe on the east shore.

SECTION 2

ENGINEERING DATA

2.1 General. There is only one plan related to Accord Pond Dam available from the Hingham Water Company. It shows water depths, property lines, and the locations of outlets at Accord Pond (copy included in Appendix B). The plan is dated March, 1898 with revisions in 1913 and 1931. No other plans, specifications or computations are available from the Owner, State or County offices relative to the design, construction or repair of this dam.

We acknowledge the assistance and cooperation of personnel of the Massachusetts Department of Environmental Quality Engineering, Division of Waterways, and the American Waterworks Service Company; and Mr. James Cypher of the Hingham Water Company.

2.2 Construction Records. The only records are the 1898 plans referred to in Section 2.1 and included in Appendix B.

There are no construction or as-built drawings for the dam, spillway or outlet structures.

2.3 Operating Records. Operating records are maintained only to monitor gravity discharge flows through the 16-inch outlet. Daily records are kept of chlorine usage at the gate house. Pond levels are read weekly from the staff gage attached to the spillway.

2.4 Evaluation

a. Availability. There is no engineering data available.

b. Adequacy. The lack of detailed hydraulic, structural and construction data did not allow for a definitive review. Therefore, the evaluation of the adequacy of this dam is based on review of the available drawing, visual inspection, past performance history and engineering judgment.

c. Validity. Comparison of the available drawings with the field survey conducted during the Phase I inspection indicates that the information is valid.

SECTION 3

VISUAL INSPECTION

3.1 Findings

a. General. The Phase I inspection of the dam at Accord Pond was performed on December 8, 1978. A copy of the inspection checklist is included in Appendix A. Previous inspections of this dam have been conducted by the Plymouth County Engineering Department every two years from 1937 through 1969; in 1973, 1975 and 1977 inspection was conducted by the Commonwealth of Massachusetts, Department of Environmental Quality Engineering, Division of Waterways. Copies of these inspection reports are included in Appendix B.

b. Dam. Accord Pond Dam consists of a 300-foot long, 8.5-foot high earth embankment. The dam is generally in fair condition. Seepage from the embankment as well as other deficiencies were observed during the site inspection. Seepage was noted at the downstream toe of the east embankment, as indicated on the Site Plan (see Figure B-1). Signs of erosion were noted at various locations on the dam. Brush is growing in a gully approximately 30 feet east of the spillway, on the upstream slope. An erosion gully is also located on the upstream slope of the dam adjacent to the spillway abutment.

Some riprap is missing on the upstream slope of the dam to the west of the spillway. This may be due to the combined effects of trespassing and erosion. Sloughing and erosion are also visible along this entire section.

The top of the upstream slope east of the spillway is eroded. This erosion begins east of the stone masonry wall, and occurs for most of the length of the dam.

There is a thick growth of brush and trees on the upstream and downstream slopes of the dam.

c. Appurtenant Structures. The spillway is 6.6 feet long with a rounded crest containing stoplogs. The height of the spillway opening at the crest is 1.5 feet. A constriction exists approximately 4.0 feet downstream of the crest where the overhead concrete slab reduces the opening to 1.0 foot high. At the toe of the spillway, the opening is 7.2 feet high.

Erosion has occurred at the bottom of the spillway and the beginning of the discharge channel, as evidenced by dislodged blocks and stone rubble. At the time of inspection, water was not discharging over the spillway. There is also an accumulation of debris, such as logs, rocks and tires at the toe of the spillway.

d. Reservoir Area. The area around Accord Pond is sparsely to well developed with about 200 residences. It is possible that more development could occur in the future. The area is wooded and grassed with some swampy areas.

e. Downstream Channel. Discharge from the spillway enters a 90-foot long, rectangular, stone-lined channel which flows into Accord Brook. The upper portion of the channel bed adjacent to the west wall contains trees and some brush. The remainder of the channel is clear. At approximately 25 feet downstream from the toe of the spillway, seepage was noted both from the channel bed and from a point midway on the east side wall. Total flow from the seepage points is estimated at 1 to 2 gallons per minute (gpm). Below the discharge channel, flow continues downstream in a narrow, irregular streambed. A small tributary stream joins Accord Brook approximately 250 feet downstream from the toe of the spillway. This stream discharges flow from the seepage area at the toe of the embankment of the dam. Further downstream, Accord Brook flows through a 48-inch reinforced concrete culvert under Whiting Street.

3.2 Evaluation. The above findings indicate that the dam is in fair condition and that there are several deficiencies which require attention. It is evident that the dam is not fully maintained. Recommended measures to improve these conditions are stated in Section 7.3.

SECTION 4

OPERATING PROCEDURES

4.1 Procedures. Under normal conditions of operation, water is discharged from Accord Pond via a 16-inch diameter gravity line during the summer months. During the winter, decreased flow is maintained in the system. As an emergency backup system, the 10-inch diameter low-level outlet and 8-inch diameter line to the standpipe are available as needed. These systems have not been used for several years. The gate house where chlorination and screening is provided also contains a globe valve on the 16-inch gravity line. This valve remains open at all times and gravity flows are controlled via gate valves at the treatment plant. Other valves located adjacent to the pumping station and gate house have not been utilized for several years and all control functions are performed at the water treatment plant.

Personnel from the Hingham Water Company visit the site daily. During the summer months, they clean the screens in the gate house, monitor chlorine usage and check the outflow of water. During the winter months, the procedure is to check to see that chlorination of the reduced water outflow is maintained. Also, a staff gage located at the spillway is read weekly and more often during periods of heavy rainfall.

4.2 Maintenance of Dam. The dam is not adequately maintained. Seepage is occurring at the toe of the embankment east of the spillway. Erosion at various locations on the embankment has not been repaired, although some erosion control work has been started on the upstream slope of the east embankment. The growth of trees and brush on the upstream and downstream slopes of the dam has not been controlled. Riprap is missing from the upstream slope of the west embankment.

4.3 Maintenance of Operating Facilities. The spillway and discharge channels are not fully maintained. Erosion has dislodged stonework near the toe of the spillway and there is an accumulation of debris on the crest and downstream slope of the spillway.

Seepage is occurring from the floor and east side wall of the discharge channel. Also brush and some trees are growing in the upper portion of the discharge channel.

The gate valve on the 16-inch intake is used regularly at the filter plant. However, facilities connected with the 10-inch and 8-inch outlets have not been used for several years and their operating condition is unknown.

4.4 Description of Any Warning System in Effect. There is no warning system in effect at this dam, however, visits are made each day to the site. Staff gage readings of pond water levels are obtained weekly and more often during periods of extended precipitation. The staff gage is mounted on the left upstream spillway abutment.

4.5 Evaluation. Although daily visits are made to the operating facilities for the water supply system, routine maintenance of the dam and spillway is insufficient, and there is no warning system in effect. This is undesirable considering the dam is in the "significant" hazard category. A program of technical inspections and maintenance and a surveillance system for this dam should be implemented as recommended in Section 7.3.

SECTION 5

HYDRAULIC/HYDROLOGIC

5.1 Evaluation of Features

a. General. The drainage area to Accord Pond is characterized by numerous ponds and swamps. The area is fairly well developed and moderately wooded. Other than Hatch Pond to the southeast and five other smaller ponds scattered throughout the drainage area, there are no other major ponds in the watershed.

b. Design Data. There are no hydraulic computations available for this dam.

c. Experience Data. Detailed hydraulic records are not available for this dam other than the weekly water level reading available from the Owner. However, the Owner has stated that the dam has never been overtopped.

d. Visual Observations. Discharge from Accord Pond is over an ungated, rounded-crest spillway with stoplogs. The discharge flows into a rectangular, stone-lined channel and then continues downstream in an irregular natural stream. One 6-inch, cast-iron pipe discharges from the gate house to the stone-lined channel adjacent to the pumping station.

As shown in Figure B-1, the spillway is constricted by a covering concrete slab. The opening between the slab and the top of the stoplogs is 0.6 feet high, and will act as an orifice during periods of high water flow. The spillway apron contained considerable debris and the stone rubble dislodged from the bottom should be replaced.

e. Test Flood Analysis. Accord Pond Dam has been classified as a small size dam of "significant" hazard potential according to the Corp of Engineers' Guidelines. For this preliminary investigation, one-quarter the PMF was used.

The PMF rate was determined to be 1,300 cfs per square mile. This calculation is based on the average slope of the drainage area of 2.2 percent, the pond-plus-swamp area to drainage area ratio of 20 percent, and extrapolation of the U.S. Army Corp of Engineers' Guide Curves for maximum probable flood peak flow rates (dated December, 1977). Applying one-quarter the full PMF to the 1.01 square miles of drainage area results in a calculated peak flood flow of 330 cfs as the test flood inflow. By adjusting the test flood inflow for surcharge storage, the maximum discharge rate was established as 84 cfs at pond El 141.0 which is 0.5 feet above the low point on the dam crest.

Hydraulic analyses indicate that the spillway without stoplogs could discharge 42.5 cfs when the water surface is at El 140.5. This discharge is 50 percent of the outflow test flood of 84 cfs.

With the stoplogs in place, the spillway can discharge a maximum of 10.6 cfs. Under these conditions, the test flood outflow would be increased to 140 cfs, and would overtop the dam by 0.9 feet.

The 6.6-foot long spillway is an ungated, rounded-crest type with stoplogs. Due to the configuration of the intake and the constriction mentioned in Part d., it is likely to clog, especially if blocked by a large tree or similar sizeable item.

Overtopping of the dam will commence at El 140.5, which is the lowest point on the west embankment. If this area was built up to El 141.7 (the lowest elevation on the east embankment), the spillway with flashboards could discharge 210 cfs, and the dam would not be overtopped.

f. Dam Failure Analysis. Based on the possible failure of a 72-foot section of the east embankment of the dam, the peak discharge rate would increase from 84 cfs to 1,000 cfs and produce a downstream wave of 1.5 feet. Failure flow could affect a restaurant, and house, and traffic on Whiting Street (Route 53). Below

Whiting Street, Accord Brook flows in a large swampy area which would absorb the flood wave. Minor flooding of the stream banks is possible downstream of Rte 228, but since most of that area is undeveloped swampland, property damage would be minimal.

SECTION 6

STRUCTURAL STABILITY

6.1 Evaluation of Structural Stability

a. Visual Observations. The evaluation of the structural stability of Accord Pond Dam is based on review of available drawings, previous inspection reports and the visual inspection conducted on December 8, 1978. As discussed In Section 3, Visual Inspection, the dam is in fair condition. Seepage is visible at the toe of the embankment, erosion is occurring on the upstream slope of the dam, some riprap is missing from the upstream slope of the dam, and trees and brush are growing on the upstream and downstream slopes. It is recommended that a more detailed investigation be conducted to evaluate the seepage at the toe of this embankment. It is also recommended that the seepage in the discharge channel be investigated.

b. Design and Construction Data. Only one plan of the pond, dated March, 1898, is available from the Hingham Water Company. This plan shows water depths for the pond, and approximate locations of structures. There are no other plans, specifications or computations available on the design, construction or repair of this dam from the Owner, County or State offices.

Information does not appear to exist on the type, shear strength and permeability of the soil and/or rock materials of the embankment.

c. Operating Records. There is no instrumentation of any type in Accord Pond Dam, and no instrumentation was ever installed in this dam. The performance of this dam under prior loading can only be inferred by physical evidence at the site.

d. Post-Construction Changes. There are no drawings available for Accord Pond Dam. The only known post-construction change was repair of the erosion on the upstream slope of the east embankment during February, 1977, as a result

of a severe storm. This repair consisted of placing a 110-foot long, 3.5 foot-high mortared stone wall along the upper portion of the slope, starting from the spillway and extending eastward.

e. Siesmic Stability. The dam is located in Seismic Zone 2 and in accordance with recommended Phase I guidelines does not warrant seismic analysis.

SECTION 7

ASSESSMENT, RECOMMENDATIONS
AND REMEDIAL MEASURES

7.1 Dam Assessment

a. Condition. Based upon a review of available data, the visual inspection of the site, and limited operational or maintenance information, there are deficiencies which must be corrected to assure the continued performance of this dam. Generally, the dam is considered to be in fair condition. However, the following signs of distress were observed at the site: seepage at the downstream toe of the east embankment and in the discharge channel, erosion at several locations on the embankment, growth of trees and brush on the upstream and downstream slopes and in the discharge channel, missing riprap on the upstream slope of the west embankment, eroded stone masonry at the toe of the spillway, and an accumulation of rocks and other debris in the spillway.

Hydraulic analyses indicate that the spillway without flashboards can discharge a flow of 42.5 cfs with the water surface at El 140.5 (the low point on the crest of the dam). An outflow test flood of 84 cfs (one-quarter PMF) will overtop the dam.

With flashboards the spillway can discharge 50 percent of the test flood before the dam is overtopped. With the stoplogs in place, the spillway can discharge 10.6 cfs.

Flow over the crest of the dam will commence at pond El 140.5, which is at a low point just west of the spillway. If the crest of the west embankment was brought up to El 141.7, which is now the elevation of the east embankment, the dam would not be overtopped by the test flood. Under these conditions, with the water surface at El 141.7, the spillway without flashboards can discharge 210 cfs.

b. Adequacy. The lack of detailed design and construction data did not allow for a definitive review. Therefore, the examination of the adequacy of this dam is based primarily on review of the available plan, visual inspection, past performance and engineering judgment.

c. Urgency. The recommendations and remedial measures outlined below should be implemented by the Owner within one year after receipt of this Phase I Inspection Report.

d. Need for Additional Investigation. Additional investigations to further assess the adequacy of the dam are outlined below in Section 7.2 Recommendations.

7.2 Recommendations. In view of the concerns over the continued performance of the dam, it is recommended that the Owner employ a qualified consultant to evaluate the seepage areas and the hydraulic impact of the constriction in the spillway channel.

Recommendations on repairs and maintenance procedures are outlined below under Section 7.3 Remedial Measures.

7.3 Remedial Measures

a. Operating and Maintenance Procedures. The dam and appurtenant structures are not adequately maintained. It is recommended that the owner accomplish the following:

(1) The area west of the spillway presently at El 140.5 (low point on the dam crest) should be brought up to El 141.7, the lowest elevation on the dam east of the spillway.

(2) Backfill and protect eroded areas on the crest and upstream slope of the embankment.

(3) Place additional riprap along the top of the upstream slope of the embankment beginning about 110 feet east of the spillway.

(4) Place riprap on the upstream slope of the embankment west of the spillway.

(5) Selectively clear trees and remove all brush from the upstream and downstream slopes of the dam and from the discharge channel.

(6) Repair/replace dislodged stone rubble at the toe of the spillway and in the upper portion of the discharge channel.

(7) Clear accumulated rock and other debris from the spillway channel.

(8) Remove accumulated trash and cut all brush at the downstream toe of the west embankment.

(9) Establish the function of the 12-inch C.I. pipe on the upstrem slope of the embankment, and determine whether its presence can affect the integrity of the dam.

(10) Implement a systematic program of maintenance inspections. As a minimum, the inspection program should consist of a monthly inspection of the dam and appurtenances, supplemented by additional inspections during and after severe storms. All repairs and maintenance should be undertaken in accordance with all applicable State regulations.

(11) Periodic inspections of this dam should be continued on an annual basis.

(12) Institute a definite plan for surveillance and a warning system during periods of unusually heavy rains and/or runoff.

(13) In the event that the integrity of the dam becomes of immediate concern, the pond level should be lowered via gravity or pumped outlets to El 132.0 which is the approximate elevation of the downstream toe of the dam embankment.

(14) Data is not available to determine outlet capacities or reservoir down times.

7.4 Alternatives. There are recommended no alternatives to implementing the recommendations and remedial measures itemized above.

APPENDIX A

PERIODIC INSPECTION CHECKLIST

ACCORD POND DAM

PERIODIC INSPECTION

PARTY ORGANIZATION

PROJECT ACCORD POND DAM

DATE 8 DEC. 1978

TIME 8:30 AM

WEATHER Overcast 35-40°F

W.S. ELEV. 136.9 U.S. 129.5 N.S.

PARTY:

1. L Branagan
2. W Checchi
3. D Cole
4. E Greco
5. G Komisarek
6. H. Lord
7.
8.
9.
10.

	PROJECT FEATURE	INSPECTED BY	REMARKS
1.	Dam	Branagan/Greco/Komisarek	
2.	Spillway	Branagan/Greco/Komisarek	
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			

PERIODIC INSPECTION CHECK LIST

PROJECT ACCORD POND DAM DATE 8 Dec. 1978

PROJECT FEATURE DAM NAME Greco

DISCIPLINE Geotechnical NAME Komisarek

U/S = upstream, D/S = downstream

AREA EVALUATED	CONDITIONS
DAM EMBANKMENT Crest Elevation	139.0
Current Pool Elevation	136.9
Maximum Impoundment to Date	Unknown
Surface Cracks	NONE
Pavement Condition	NONE
Movement or Settlement of Crest	Some minor differential settlement
Lateral Movement	None visible
Vertical Alignment	Relatively flat
Horizontal Alignment	Curves in SW direction from each abutment
Condition at Abutment and at Concrete Structures	Good condition left and right sides
Indications of Movement of Structural Items on Slopes	None visible although rip rap on right U/S slope new
Trespassing on Slopes	See attached sheet note 1
Sloughing or Erosion of Slopes or Abutments	See attached sheet note 2
Rock Slope Protection - Riprap Failures	See attached sheet note 3
Unusual Movement or Cracking at or near Toes	None visible
Unusual Embankment or Downstream Seepage	See attached sheet note 4
Piping or Boils	NONE
Foundation Drainage Features	NONE
Toe Drains	None visible
Instrumentation System	NONE

)TES:

. Trespassing on Slopes: Foot path on crest left abut.; right D/S slope used as access road onto crest, also has foot path.

. Sloughing or Erosion of Slopes or Abutments: Left U/S slope has severe sloughing and erosion. Right U/S has erosion gully near spillway. Erosion above riprap both U/S slopes.

. Rock Slope Protection - Riprap Failures: Erosion gully right U/S slope near spillway also erosion at top of riprap.left U/S slope riprap dislodged, extensive erosion above riprap.

Unusual Embankment or Downstream Seepage: Left D/S embankment has brush filled gully - no seepage visible. Right D/S toe area has ponded water (clear)-flows D/S to small stream.

PERIODIC INSPECTION CHECK LIST

PROJECT ACCORD POND DAM DATE 8 DEC. 1978

PROJECT FEATURE Gate House NAME Greco

DISCIPLINE Geotechnical NAME Komisarek

AREA EVALUATED	CONDITION
OUTLET WORKS - TRANSITION AND CONDUIT General Condition of Concrete	Brick & mortar superstructure with cut block stone foundation and wood roof, with asphalt shingles. no concrete.
Rust or Staining on Concrete	None
Spalling	None
Erosion or Cavitation	None
Cracking	None
Alignment of Monoliths	Brick and mortar
Alignment of Joints	Good
Numbering of Monoliths	None

PERIODIC INSPECTION CHECK LIST

PROJECT ACCORD POND DAM DATE 8 DEC. 1978

PROJECT FEATURE NAME Greco

DISCIPLINE Geotechnical NAME Komisarek

AREA EVALUATED	CONDITION
OUTLET WORKS - SPILLWAY WEIR, APPROACH AND DISCHARGE CHANNELS	
a. Approach Channel	
General Condition	Good-sandy bottom w/scattered boulders, mounded in front of approach
Loose Rock Overhanging Channel	None-except for dislodged riprap on left U/S spillway abutment
Trees Overhanging Channel	Few on spillway abutments
Floor of Approach Channel	Sandy with gravel and boulders
b. Weir and Training Walls	See attached Note 1
General Condition of Concrete	Fair to good. New staff gauge installed on left training wall. stoplogs seated onto conc. base
Rust or Staining	Access door to flash boards rusted. Some staining on rubble.
Spalling	Minor spalling of slabs. Right U/S slab corner chipped.
Any Visible Reinforcing	reinforcing exposed in bottom of slab
Any Seepage or Efflorescence	None
Drain Holes	None
c. Discharge Channel	See attached Note 2
General Condition	See attached Note 3
Loose Rock Overhanging Channel	None
Trees Overhanging Channel	Numerous on left d/s side. Small trees in bottom.
Floor of Channel	Fair, some debris. seepage in bottom & right wall adjacent to pump house
Other Obstructions	None

ACCORD POND DAM

NOTES:

1. b. Weir and Training Walls: Walls of masonry and stone rubble capped with concrete slab-good condition.

2. c. Discharge Channel: Partially convered by concrete slab adjacent to flash boards. Open beyond.

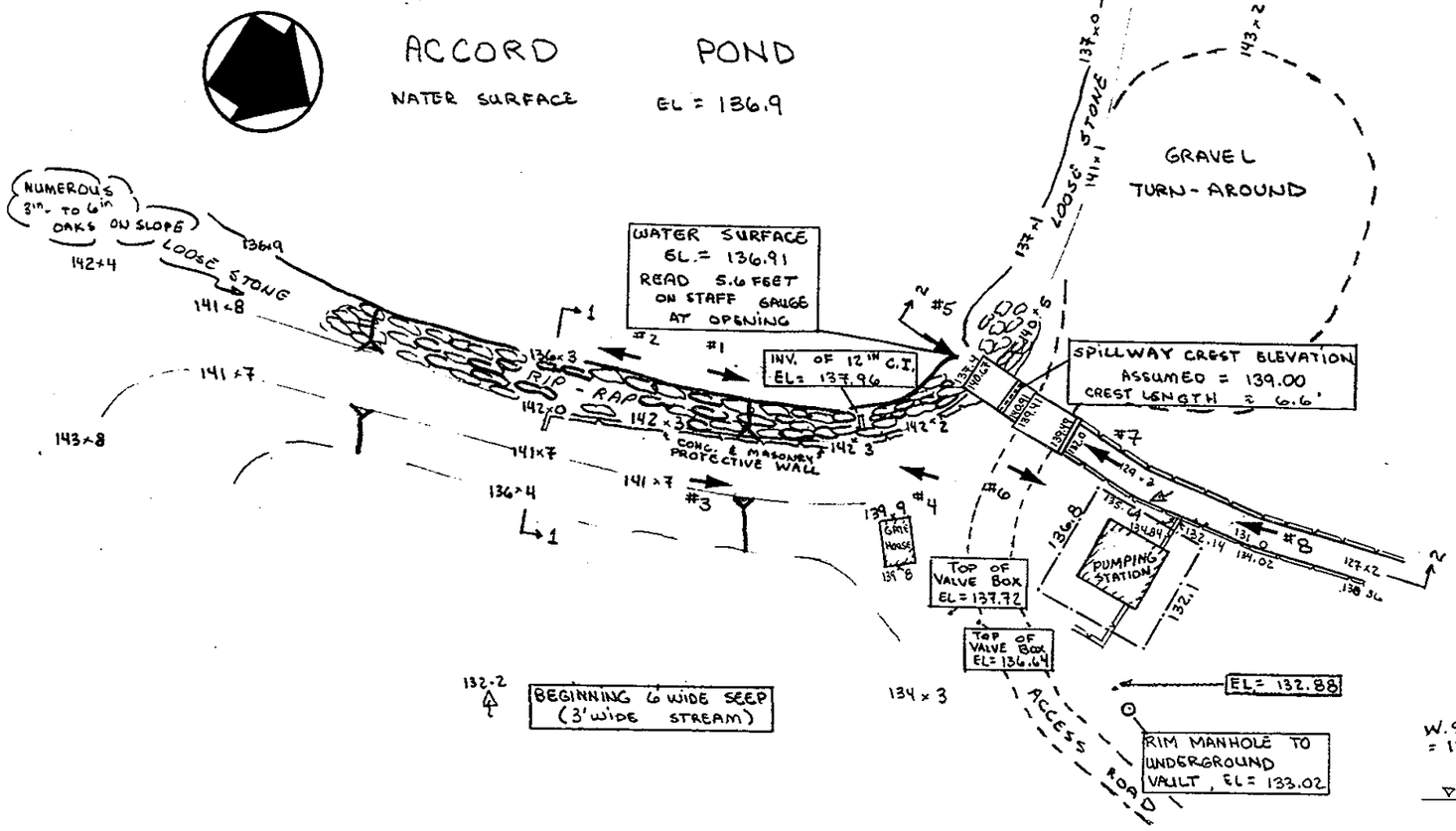
3. General Condition: Fair to good with erosion or scour of rubble blocks at D/S toe of spillway. Some blocks dislodged. Seepage in bottom adjacent to structure.

APPENDIX B

PLAN OF DAM AND PREVIOUS INSPECTION REPORTS

ACCORD POND

NATER SURFACE EL = 136.9



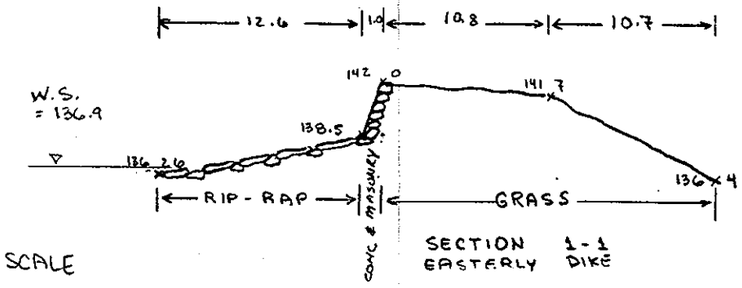
NOTES:

1. ELEVATIONS SHOWN ARE REFERENCED TO ASSUMED BENCHMARK ELEV. 139.0 (MSL) ON SPILLWAY CREST
2. INFORMATION SHOWN BASED ON FIELD SURVEY OF DECEMBER 8, 1978
3. ⇕ DENOTES SEEPAGE
4. #2 INDICATES LOCATION AND DIRECTION OF VIEW FOR PHOTOGRAPHS

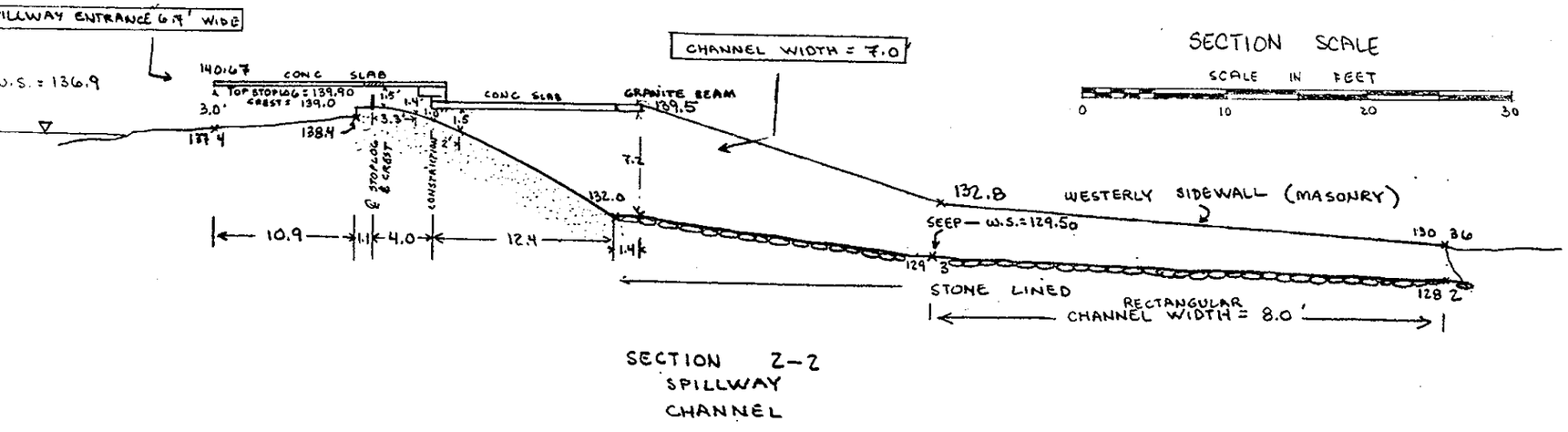
PLAN SCALE

IN FEET

0 40 80



SECTION 1-1 EASTERLY DIKE



SECTION SCALE

SCALE IN FEET

0 10 20 30

SECTION 2-2 SPILLWAY CHANNEL

METCALF & EDDY, INC. ENGINEERS BOSTON, MA.

U.S. ARMY ENGINEER DIV. NEW ENGLAND CORPS OF ENGINEERS WALTHAM, MA.

NATIONAL PROGRAM OF INSPECTION OF NON-FED. DAMS

ACCORD POND DAM

FIGURE 8-1 PLAN OF DAM AND SECTIONS

TRIBUTARY WIER RIVER MASSACHUSETTS

SCALE: AS SHOWN DATE: FEBRUARY, 1979

Copy of part of plan entitled

PLAN OF ACCORD POND
from stadia surveys
and of
LAND BORDERING SAME
compiled from various sources
WALTER B.FOSTER,C.E. SCALE 150ft = 1in
MARCH,1898

Area of pond=100.8 acres
Depth in feet
Corrected to JAN 1913

ESTIMATED CONTENTS=516,000,000 Gallons
Depths taken JANUARY 29,1931 by S.A. AGNEW

NOTE: PLAN REDUCED FOR THIS REPORT

FIGURE B-2

The Commonwealth of Massachusetts

EXECUTIVE OFFICE OF ENVIRONMENTAL AFFAIRS
DEPARTMENT OF ENVIRONMENTAL QUALITY ENGR.
DIVISION OF WATERWAYS

100 Nashua Street, Boston 02114

November 16, 1977

ngham Water Co.
South Street
ngham, Mass.

RE: Insp. Dam #7-12-131-5
Accord Pond Dam
Hingham

ar Sir:

On April 25, 1977, an Engineer from the Massachusetts Department Public Works made a visual inspection of the above dam. Our records indite the owner to be Hingham Water Co. If this information incorrect will you please notify this office.

The inspection was made in accordance with the provisions of Chapter 253 of e Massachusetts General Laws as amended (Dams Safety Act). Chapter 705 of the ts of 1975 transferred the jurisdiction of the so-called "Dams Safety Program" the Commissioner of the Department of Environmental Quality Engineering.

The results of the inspection indicate that this dam is safe; however, the llowing conditions were noted that require attention:

Brush and trees on both faces and in the spillway should be removed. Debris spillway should be removed.

Eroded areas on the upstream face at the flume and along the 200' dike ould be corrected.

We call these conditions to your attention before they become serious and re expensive to correct. With any correspondence please include the number of e Dam as indicated above.

Very truly yours,

John J. Hannon, P.E.
Chief Engineer

:: bjm
: Vito Cassese, DHE
Richard Slade, DDRE

INSPECTION REPORT - DAMS AND RESERVOIRS

1. Location: ~~City~~/Town Hingham Dam No. 7-12-131-5

DEPARTMENT OF ENVIRONMENTAL QUALITY ENGINEERING DIVISION OF WATERWAYS

Name of Dam Accord Pond. Inspected by: Richard H. Slade

RECEIVED MAY 11 1977

Date of Inspection: 4-25-'77

2. Owner/s: Per: Assessors x Prev. Inspection 7-23-'75

Referred To
Report back to
File

Reg. of Deeds Pers. Contact

1. Hingham Water Co., 28 South Street. Hingham - Mass.

Name	St. & No.	City/Town	State	Tel. No.

Name	St. & No.	City/Town	State	Tel. No.

Name	St. & No.	City/Town	State	Tel. No.

3. Caretaker: (if any) e.g. superintendent, plant manager appointed by absentee owner, appointed by multi-owners.

Name	St. & No.	City/Town	State	Tel. No.

4. No. of Pictures taken: none

5. Degree of Hazard: (if dam should fail completely)*

1. Minor 2. Moderate

3. Severe x 4. Disastrous

*This rating may change as land use changes (future development)

6. Outlet Control: Automatic Manual x

Operative: Yes x No

Comments: conc. flume w/flashboards and pump house.

7. Upstream Face of Dam:

Conditions:

1. Good x 2. Minor Repairs x

3. Major Repairs 4. Urgent Repairs

Comments: erosion was noted on both sides of the flume this date.

Trees along the face still need cutting.

Additional erosion was noted along the 200' dike.

Dam No. 7-12-131-5

8. Downstream Face of Dam:

Conditions:

1. Good x 2. Minor Repairs x

3. Major Repairs ____ 4. Urgent Repairs ____

Comments: some debris & growing trees noted within the paved spillway.. (thru' the floor & walls)

9. Emergency Spillway: none

Conditions:

1. Good ____ 2. Minor Repairs ____

3. Major Repairs ____ 4. Urgent Repairs ____

Comments: ____

10. Water Level at Time of Inspection:

1.2 ft. ____ above x below top of dam.

x principal spillway ____ other

11. Summary of Deficiencies Noted:

Growth (Trees & Brush) on Embankment yes. upstream & in spillway.

Animal Burrows & Washouts no

Damage to Slopes or Top of Dam no

Cracked or Damaged Masonry no

Evidence of Seepage no

Evidence of Piping no

Erosion yes - some upstream

Leaks no

Trash and/or Debris Impeding Flow yes - some in spillway

Clogged or Blocked Spillway ____

Other ____

Dam No. 7-12-131-5

12. Remarks & Recommendations (fully explain)

There appears to have been very little work done here since the last report of 7-23-'75 except that some brush has been removed.

Numerous trees were noted on the upstream face - also growing in the spillway together with some debris here, but not impeding the flow due to the height or drop of the spillway. This debris should be removed.

eroded areas on the upstream face at the flume and along the 200' dike - should be filled.

13. Overall Condition:

1. Safe x
2. Minor Repairs Needed x
3. Conditionally Safe - Major Repairs Needed
4. Unsafe
5. Reservoir Impoundment no Longer Exists (explain)

   Recommend Removal from Inspection List

September 18, 1975

Hingham Water Company
23 South Street
Hingham, Massachusetts

RE: Inspection - Dam #7-12-131-5
Hingham
Accord Pond Dam

Gentlemen:

On July 23, 1975, an engineer from the Massachusetts Department of Public Works made a visual inspection of the above dam. Our records indicate that the Hingham Water Company is the owner. Will you please notify this office if this information is not current.

The inspection was made in accordance with Chapter 253 of the Massachusetts General Laws, as amended by Chapter 595 of the Acts of 1970 (Dams-Safety Act).

The results of the inspection indicate that this dam is safe; however, deficiencies that were noted in the notice of May 15, 1973 have not been attended to. They are again listed for your attention:

1. Remove the growth of brush and trees from the upstream embankment of the dam.

2. There are numerous areas of erosion which should be filled with suitable material, properly compacted, graded and then seeded.

We call these conditions to your attention now, before they become serious and more expensive to correct. With any correspondence, please include the number of the dam as indicated above.

Very truly yours,

ROBERT T. TIERNEY, P.E.
Chief Engineer

LRA:jmp
cc: Hingham Conservation Comm.
R. J. Kelleher
K. B. Harrison

INSPECTION REPORT - DAMS AND RESERVOIRS

1. Location: ~~City~~/Town Hingham Dam No. 7-12-131-5

Name of Dam Accord Pond Inspected by: K. B. Harrison & G. G. Bumpus

Date of Inspection: 7-23-75

2. Owner/s: Per: Assessors ✓ Prev. Inspection 4-18-73

Reg. of Deeds _____ Pers. Contact _____

1. Hingham Water Co., 28 South St., Hingham, Mass.
Name St. & No. City/ Town State Tel. No.

Name St. & No. City/Town State Tel. No.

Name St. & No. City/Town State Tel. No.

3. Caretaker:(if any) e.g. superintendent, plant manager, appointed by absentee owner, appointed by multi owners.

Name St. & No. City/Town State Tel. No.

4. No. of Pictures taken: None

5. Degree of Hazard: (if dam should fail completely)*

1. Minor _____ 2. Moderate _____

3. Severe ✓ 4. Disastrous _____

*This rating may change as land use changes (future development)

6. Outlet Control: Automatic _____ Manual ✓

Operative ✓ Yes _____ No

Comments: Conc. Flume w/flashboards - also, pump house

7. Upstream Face of Dam: Condition:

Conditions:

1. Good ✓ 2. Minor Repairs ✓

3. Major Repairs _____ 4. Urgent Repairs _____

Comments: Trees & brush still need cutting and eroded areas S.E. of spillway have not been filled.

8. Downstream Face of Dam:

Condition: 1. Good ✓ 2. Minor Repairs ✓

3. Major Repairs ____ 4. Urgent Repairs ____

Comments: Trees adjacent to spillway could be cut.

9. Emergency Spillway: None

Condition: 1. Good ____ 2. Minor Repairs ____

3. Major Repairs ____ 4. Urgent Repairs ____

Comments: ____

0. Water Level at Time of Inspection:

2.4 ft. ____ above. ✓ below. ____ top of dam.

✓ principal spillway. ____ other.

1. Summary of Deficiencies Noted:

Growth (Trees & Brush) on Embankment Yes - numerous - upstream

Animal Burrows & Washouts No

Damage to Slopes or Top of Dam ____

Cracked or Damaged Masonry ____

Evidence of Seepage ____

Evidence of Piping No

Erosion Yes - upstream slopes

Leaks No

Trash and/or Debris Impeding Flow ____

Clogged or Blocked Spillway ____

Other No

12. Remarks & Recommendations (fully explain)

No work done on this dam since previous report dated 4-18-73.
Trees & brush on upstream face need cutting, and various eroded areas previously reported still need fill.
Other than the above, dam is in good condition.

13. Overall Condition:

1. Safe ✓
2. Minor Repairs Needed ✓
3. Conditionally Safe - Major Repairs Needed
4. Unsafe
5. Reservoir Impoundment no Longer Exists (explain)

Recommend Removal from Inspection List

1

DESCRIPTION OF DAM

DISTRICT 7

Submitted by: K.B. Harrison Dam. No. 7-12-131-5

Date 8-29-75 ~~City~~/Town Hingham

Name of Dam Accord Pond

1. Location: Topo Sheet No. 39A

Provide 8½" x 11" in clear copy of topo map with location of Dam clearly indicated.

2. Year Built: Prior to 1937 Year/s of Subsequent Repairs Unknown

3. Purpose of Dam: Water Supply ✓ Recreational

Irrigation Other

4. Drainage Area: 2 Sq. Mi. Acres

5. Normal Ponding Area: Acres Ave. Depth

Impoundment: 350,000,000 Gals. Acre Ft.

6. No. and Type of Dwellings Located Adjacent to Pond or Reservoir

i.e. Summer Homes, etc. 4 Homes - 1 Pump House - 1 Gate House

7. Dimensions of Dam: Length 500' Max. Height 10'-12'

Slopes: Upstream Face Varies 8'-12' wide

Downstream Face All variable - mostly flat to high ground

Width Across Top 11' minimum

8. Classification of Dam by Material:

Earth ✓ Conc. Masonry Stone Masonry

Timber Rockfill ✓ Other

9. A. Description of Present Land Usage Downstream of Dam:

25 % Rural 75 % Urban

B. Is there a storage area or flood plain downstream of dam which could accommodate the impoundment in the event of a complete dam failure

Probably Yes No

Dam No. 7-12-131-5

10. Risk to Life and Property in Event of Complete Failure

No. of People 0

No. of Homes 0

No. of Businesses 2 (Restaurant & T.V. Shop)

No. of Industries 0 Type

No. of Utilities 4 Type Tel, Elect, Gas, & Water

Railroads 0

Other Dams 0

Other Whiting St. (Rte. #53) & Main St.

11. Attach sketch of dam to this form showing section and plan on an 8½" x 11" sheet.

May 15, 1973

Hingham Water Co.
28 South Street
Hingham, Massachusetts 02043

RE: Inspection-Dam #7-12-131-5
Hingham
Accord Pond Dam

Gentlemen:

An engineer from the Massachusetts Department of Public Works has inspected the above dam, owned by the Hingham Water Co.

The inspection was made in accordance with Chapter 253 of the Massachusetts General Laws, as amended by Chapter 595 of the Acts of 1970.

The results of this inspection indicate that minor repairs are needed. The following conditions were noted that require attention:

1. Remove the growth of trees from the embankment of the dam.

2. Erosion was noted adjacent to the pump house and both sides of the spillway. These areas require backfill with suitable material, properly compacted and graded.

We call these conditions to your attention now, before they become serious and expensive to correct.

Very truly yours,

FRED. C. SCHWELM P.E.
Deputy Chief Engineer

LRA:acs
c.c. R.Kelleher D.H.E.#7
A.Duggn Dist. #7

INSPECTION REPORT - DAMS AND RESERVOIRS

1. Location: ~~City~~/Town HINGHAM Dam No. 7-12-131-5

Name of Dam RECORD POND Inspected by: ART DUGAN

Date of Inspection 4/18/73

2. Owner/s: Per: Assessors X Prev. Inspection X

Reg. of Deeds _____ Pers. Contact _____

1. HINGHAM WATER Co., 28 SOUTH ST. HINGHAM, MASS.
Name St.& No. City/Town State Tel.No.

Name St.& No. City/Town State Tel.No.

Name St.& No. City/Town State Tel.No.

3. Caretaker:(if any) e.g. superintendent, plant manager, appointed by absentee owner, appointed by multi owners.

Name St.& No. City/Town State Tel.No.

4. No. of Pictures taken NONE

5. Degree of Hazard: (if dam should fail completely)*

1. Minor _____ 2. Moderate _____

3. Severe X 4. Disastrous _____

*This rating may change as land use changes (future development)

6. Outlet Control: Automatic X Manual _____

Operative _____ yes; _____ No

Comments: FIXED EXCEPT THROUGH PUMP HOUSE

7. Upstream Face of Dam: Condition:

Conditions:

1. Good _____ 2. Minor Repairs X

3. Major Repairs _____ 4. Urgent Repairs _____

Comments: NUMEROUS TREES AND SOME EROSION

Dam No. 7-12-131-5

8. Downstream Face of Dam:
Condition: 1. Good X 2. Minor Repairs
3. Major Repairs 4. Urgent Repairs
Comments: A FEW TREES

9. Emergency Spillway:
Condition: 1. Good 2. Minor Repairs
3. Major Repairs 4. Urgent Repairs
Comments: NONE

10. Water Level at Time of Inspection:
1.8 ft. above . below X . top of dam
TOP principal spillway X . other .

11. Summary of Deficiencies Noted:
Growth (Trees & Brush) on Embankment YES
Animal Burrows & Washouts NO
Damage to Slopes or Top of Dam SOME
Cracked or Damaged Masonry NO
Evidence of Seepage NO
Evidence of Piping NO
Erosion YES - MINOR
Leaks NO
Trash and/or Debris Impeding Flow NO
Clogged or Blocked Spillway NO
Other

Dam No. 7-12-131-5

12. Remarks & Recommendations: (Fully Explain)

TREES NEED TO BE REMOVED FROM FRONT FACE OF DAM. ALSO A FEW TREES TO BE REMOVED FROM BACK FACE OF DAM.

EROSION BY PUMP HOUSE AND BOTH SIDES OF SPILLWAY SHOULD BE FILLED.

OTHERWISE DAM IS IN GOOD CONDITION

---

13. Overall Condition:

1. Safe _____
2. Minor Repairs Needed X
3. Conditionally Safe - Major Repairs Needed _____
4. Unsafe _____
5. Reservoir Impoundment no Longer Exists (explain)

   Recommend Removal from Inspection List _____

DESCRIPTION OF DAM

DISTRICT 7

Submitted by ART DUGAN Dam No. 7-12-131-5

Date 4/18/73 ~~City~~/Town HINGHAM

Name of Dam ACCORD POND

1. Location: Topo Sheet No. 39A

Provide 8½" x 11" in clear copy of topo map with location of Dam clearly indicated.

2. Year Built _____ Year/s of Subsequent Repairs _____

3. Purpose of Dam: Water Supply X Recreational _____

Irrigation _____ Other _____

4. Drainage Area: 2 Sq.Mi. _____ Acres

5. Normal Ponding Area: _____ Acres _____ Ave.Depth

Impoundment: 350,000,000 Gals. _____ Acre Ft.

6. No. and Type of Dwellings Located Adjacent to Pond or Reservoir

i.e. Summer Homes, etc. 1 RESTAURANT - 2 HOUSES

7. Dimensions of Dam: Length 500 FT Max. Height 12 FT.

Slopes: Upstream Face 3-4 FT.

Downstream Face 3 FT.

Width Across Top 11FT. PLUS

8. Classification of Dam by Material:

Earth X Conc. Masonry _____ Stone Mason. _____

Timber _____ Rockfill _____ Other _____

DAM NO. 7-12-131-5

A. Description of Present Land Usage Downstream of Dam:

40 % rural 60 % urban

B. Is there a storage area or flood plain downstream of dam which could accommodate the impoundment in the event of a complete dam failure X yes _____ no
PROBABLY

10.

Risk to Life and Property in Event of Complete Failure

No. of People NONE

No. of Homes NONE

No. of Businesses 1 RESTAURANT

No. of Industries NONE Type _____

No. of Utilities NONE Type _____

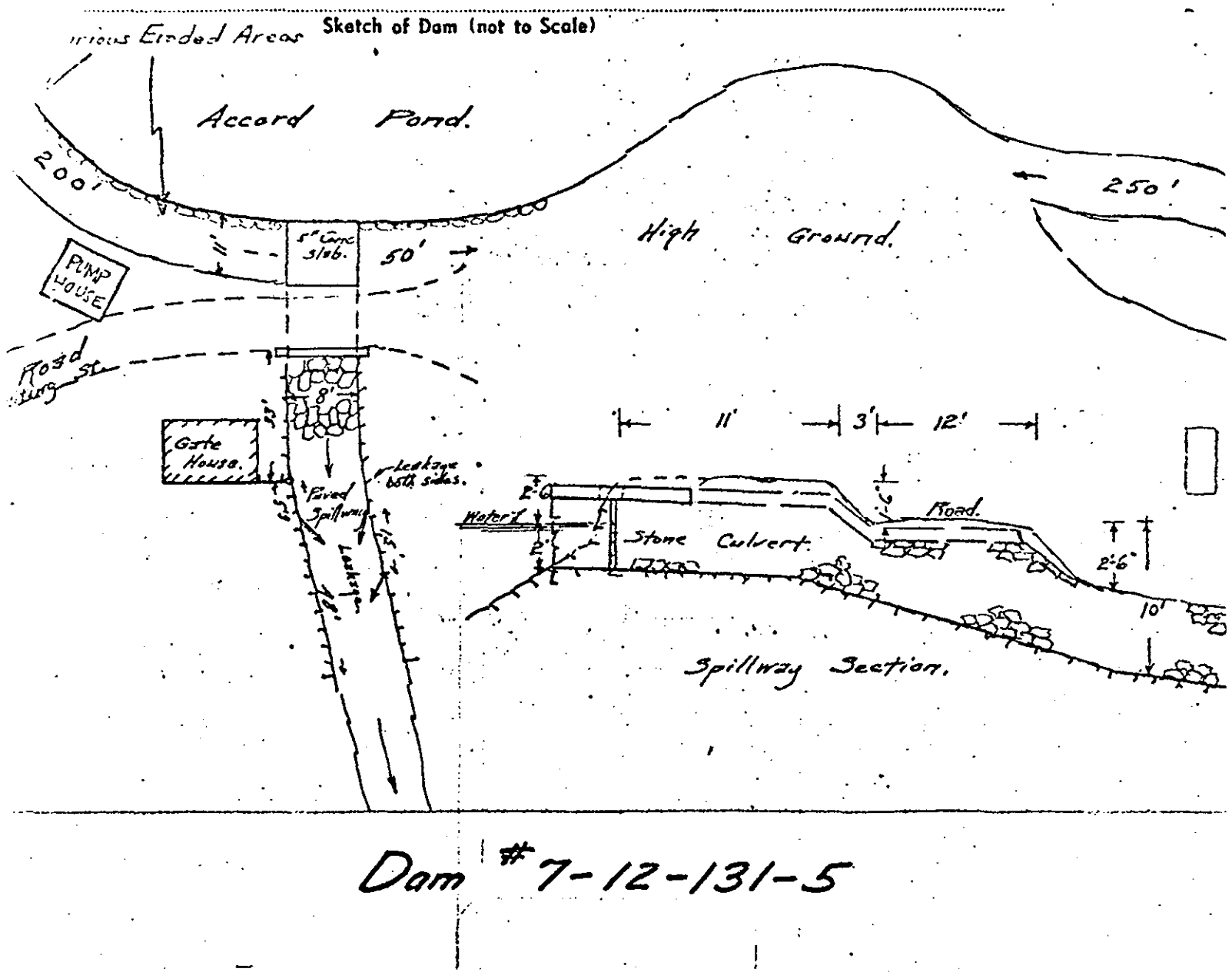
Railroads NONE

Other Dams No

Other WHITING ST.

11.

Attach sketch of dam to this form showing section and plan on an 8½" x 11" sheet.


Sketch of Dam (not to Scale)
rious Eroded Areas
Accord Pond.
200'
250'
5" Conc. Slab.
50'
High Ground.
PUMP HOUSE
Road
8'
Gate House.
Leakage both sides.
Paved Spillway
Leakage
11'
3'
12'
Water
Stone Culvert.
Road.
2'-6"
10'
Spillway Section.
Dam # 7-12-131-5

DAM NO. 178

COUNTY OF PLYMOUTH, MASSACHUSETTS
ENGINEERING DEPARTMENT
INSPECTION OF DAM AND RESERVOIRS

Inspector Groerer & Boyce. Date January 1937 City or Town Hingham

Location off Whiting Street at Accord Pond

Owner Hingham Water Company Use Reservoir

Material and Type Natural Pond built up by Earth Dyke with paved slope.

Maximum Head in Feet (Full Pond Level to Bottom of Spillway) 10 to 12 feet (Pond varies)

Length 500 feet. Width 11 feet.

Area of Watershed 2 Sq. Miles. Capacity 350,000,000 Gallons above natural level.

Length of Overflow or Spillway 8 feet. Outlets (Pipes or Flumes)

Water Pipe for Hingham Water Supply.

Dam Constructed by Hingham Water Co. Date

Recent Repairs Date

Evidence of Leakage None.

Condition Sound – Well Maintained.

Topography of Country Below Fairly Flat – Some meadow – Some woodland.

Nature, extent, proximity, etc. of buildings, roads or other property in danger if failure should occur.

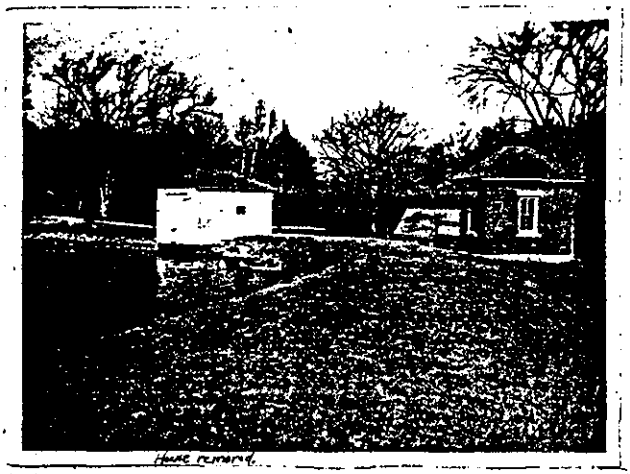
Would damage Whiting Street and possibly flood one or two cellars – then spread out without further damage. Failure most unlikely.

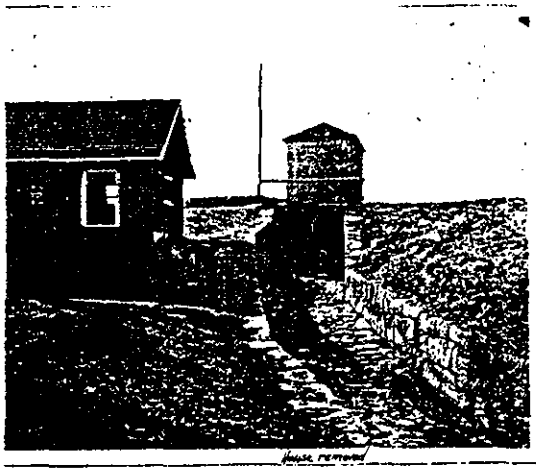
Remarks and Recommendations Spillway ample.

Accord Pond is the main water supply for the Town of Hingham and is consequently well maintained.

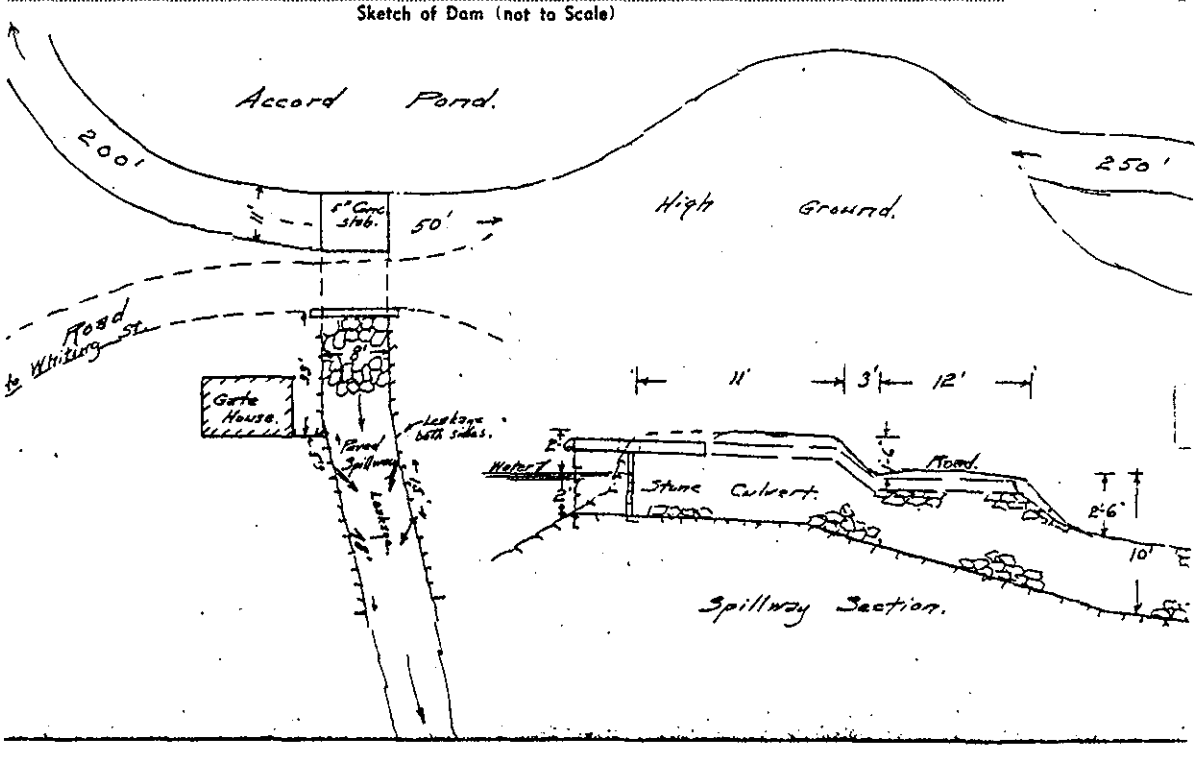
Unchanged Sept. 1938. Unchanged Aug. 1940. Same condition Nov. 1942. Unchanged June, 1944. No change Sept. 1946. No change Mar. 1949. Sound-unchanged Dec. 1950. Good-no changes Oct. 1952. Good-no change June 1954. No change Nov. 1956. Good condition-well maintained Sept. 1958. Same-good condition Oct. 1960. Good-no changes Oct. 1962. Good-building gone. Oct. 1964. Good-no change Dec. 1966. Good-no change Oct. 1968. Good-no change Oct. 1969.

NO. 178





Sketch of Dam (not to Scale)



ACCORD POND DAM

APPENDIX C

PHOTOGRAPHS

ACCORD POND DAM

NO. 1 VIEW OF UPSTREAM SLOPE AND SPILLWAY

NO. 2 VIEW OF RIGHT UPSTREAM SLOPE

NO. 3 CREST OF DAM AND GATEHOUSE FROM SOUTH ABUTMENT

NO. 4 DOWNSTREAM SLOPE OF SOUTH ABUTMENT

NO. 5 VIEW OF FLASHBOARDS ON SPILLWAY

NO. 6 VIEW OF DOWNSTREAM SPILLWAY CHANNEL AND PUMP HOUSE

NO. 7 VIEW OF SPILLWAY DISCHARGE CHANNEL

NO. 8 VIEW OF SPILLWAY DISCHARGE CHANNEL

APPENDIX D

HYDROLOGIC AND HYDRAULIC COMPUTATIONS

ACCORD POND DAM

(I) Test Flood, Storage & Storage Functions

1 – Total Drainage Area – 1.01 mi^2

2 – Pond(s) Area: 0.149 + 0.007 = 0.156 mi^2
Swamp(s) Area: 0.046 + 0.007 = 0.053 "
Total Area Pond(s) & Swamp(s): 0.209 "

% Ponds & Swamps = $\frac{0.209}{1.01} \cong 20\%$

3 – $\frac{180-139}{3400} = 1.2\%$; $\frac{185-139}{1100} = 4.2\%$ } Say Ave Slope = 2.2%

4 – Using C. of E. Curves for Peak Flow Rates & above guide values the Peak Flow Rate was estimated to be somewhat above "Flat & Coastal" and taken at 1300 c.f.s./mi^2
Size Class: Small ; Hazard Pot.: Signif. ; Spill. Des. Flood: 100yr to ½ PMF
Use: Test Flood = 100 yr. ~~– taken as ≅ ¼ PMF~~

5 – Test Flood Inflow = $\frac{1}{4}(1300)\,1.01$ = **330 cfs.**

6 – Pond Storage
The pond area is 0.149 sq. mi. at elev. 139. Based on a const. area, storage increases at 95.5 ac. feet per foot of depth increase.

7 – Spillway crest elev. is 139 (w/out stoplogs)

8 – Storage Functions are based on $Q_{out} = Q_{in}\left[1 - \frac{S_{out}}{R}\right]$
S_{out} = Storage Vol. in Reservoir related to final Q_{out} in terms of inches of rain over the drainage area.

$S(\text{in Inches}) = 12\,D\left(\frac{0.149}{1.01}\right) = 1.77\ D$; R = 6hr rain of Storm
D = Storage depth in feet above spillway crest in reservoir

9 – Storage Functions: (Test Flood & ½ PMF – if needed)

F_{TF}	= 330 – 69.5 S	= 330 – 123 D
$F_{½PMF}$	= 660 – 69.5 S	= 660 – 123 D

(II) Discharge Ratings

A · Spillway

Crest: Rounded, Width: 6'-7", El. Crest 139, El. Stoplog 139.9
Bot of Cover Slab El. 140.5, Constriction bel. crest - 1' High

1- Flow w/out Stoplogs

Use $Q_s = 3.12\ L\ H_s^{1.5}$ [Ref.: V.T. Chow, "Open Chan Hydr" pg 360-362]

Pond El.	139.5	140	140.5
H_s	0.5	1.0	1.5
Q_s	7.2	20.5	37.7

2- Stoplog Flow

Treat as Sharp Weir. Use "Hyd. Tables" - Williams & Hazen
$P \cong 2'$; Top of stoplogs @ el. 139.9
(Note: See 3-b for Pond El. > 140.5)

Pond El.	140.0	140.5
q_L	0.13	1.62
Q_L	0.86	10.6

3 · Constricted Flow

a- Constr. Below Crest
Treat as Orifice: $Q_o = C_D A \sqrt{2g H_o}$
¢ orifice @ el. 138.7, $C_D \cong 0.6$, $A = 6.58(1) = 6.58\ ft^2$
$\therefore Q_{o_A} = 31.68\ H_{o_A}^{1/2}$

Pond El.	140.5	141.0	141.5	142.0	142.5	143.0
H_{o_A}	1.8	2.3	2.8	3.3	3.8	4.3
Q_{o_A}	42.5	48.0	53.0	57.6	61.8	65.7

b- Constr. at Stoplogs
¢ orifice @ el. 140.2, $A = 6.58(0.6)$, $C_D \cong 0.6$; $Q_{o_B} = 19.0\ H_{o_B}^{1/2}$

Pond El.	141.0	141.5	142.0	142.5
H_{o_B}	0.8	1.3	1.8	2.3
Q_{o_B}	17	21.7	25.5	28.8

(II) Discharge Ratings

B- Crest Flow

① 40'@ 140.5 ; ② 45'@141.1 ; ③ 60'@ 141.8 ; ④ 170'@ 142.2

Use $q_c = 2.55\ H_c^{1.5}$ [Ref.: V.T.Chow "Op.Ch.Hydr" pg 52-53]

Pond El.	141.0	141.5	142.0	142.5	143.0
Q_1	36	102	187	288	403
Q_2	—	29	98	190	300
Q_3	—	—	14	90	201
Q_4	—	—	—	71	310
ΣQ_c	36	131	299	639	1214

(III) Crest Flow Conditions

Max. hd. on crest = 141.0 − 140.5 = 0.5'

$q = 2.55(0.5)^{1.5} = 0.90$ cfs/ft.

Where flow is "critical":

$$y_c = \sqrt[3]{\frac{(0.9)^2}{g}} = 0.29 \text{ ft}$$

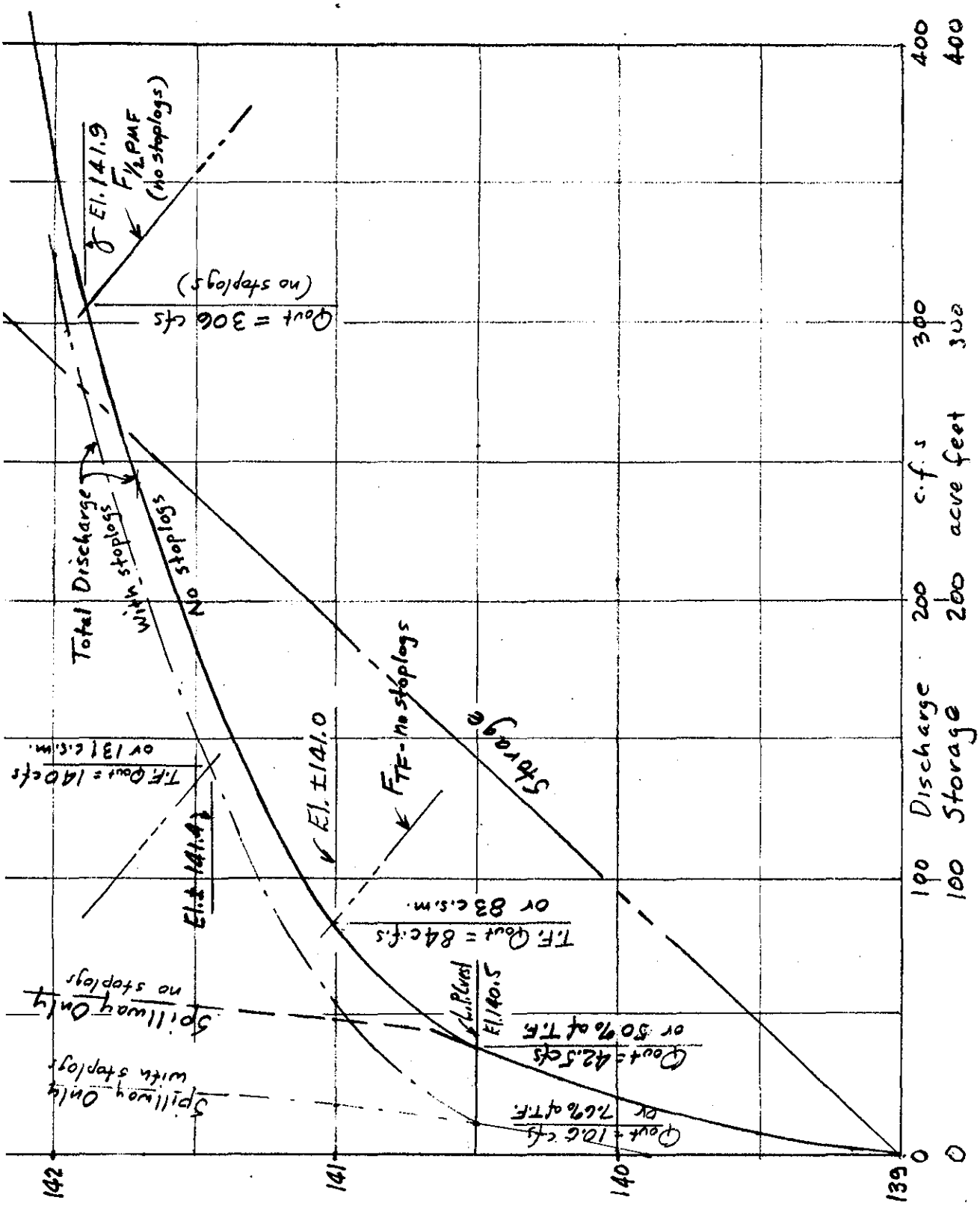
$$V_c = \frac{0.9}{0.29} = 3.1 \text{ fps}$$

Project Nat. Review of Non Fed. Dams Acct. No. 6191 Page 4 of 5

Subject Plymouth County, Mass Comptd. By LEB Date 2/6/79

Detail ACCORD POND DAM Ck'd. By Date

(IV) Discharge, Storage & Storage Function vs Pond Elev.



(V) Failure of Dam

Peak Failure Flow:

Pond Elevation - 140.5 (L.P. Dam)
Toe Elevation — 136.4 (Toe El. @ narrow section)
Y_o = 4.1

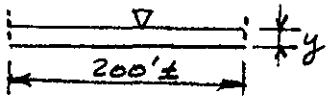
Dam Length Subject to Breaching = 180' (narrow sect.)
$W_o = 40\%(180) = 72$

$$Q_{P_1} = 1.68\, W_o (Y_o)^{1.5} = 1.68\,(72)\,(4.1)^{1.5} = 1000 \text{ cfs}$$

Storage Volume Released:

Storage Above Spillway 1.5(95.5ac) = 143 ac. ft.
Storage Below Spillway 1/3(2.6)95.5 = 96 " "
S = Total Storage = 239 " "

Channel Hydraulics:



$S = \frac{9'}{500'}$, $n = .08$, $V = \frac{1.49}{.08} R^{2/3} S^{1/2}$
$R \simeq y$, $A = 200y$; $\therefore V = 2.5\, y^{2/3}$

y	A	V	Q
1.0	200	2.5	500
1.5	300	3.3	980
2.0	400	4.0	1590

} Failure flow ≃ 1.5 ave. depth

Down stream channel storage not applicable
Failure flow could affect 1 resturant, 1 house and traffic on Rte 53, before spreading in swamp.

Time to Drain:

$$\frac{43560\ (239)}{3600\,(1/2)\,(1000)} = 5.8 \text{ Hours, or } 347 \text{ Minutes}$$

APPENDIX E

INFORMATION AS CONTAINED IN THE NATIONAL INVENTORY OF DAMS

ACCORD POND DAM

INVENTORY OF DAMS IN THE UNITED STATES

STATE	IDENTITY NUMBER	DIVISION	STATE	COUNTY	CONGR DIST.	STATE	COUNTY	CONGR DIST.	NAME	LATITUDE (NORTH)	LONGITUDE (WEST)	REPORT DATE DAY	MO	YR
MA	430	NED	MA	023	12				ACCORD POND DAM	4210.4	7053.4	05	MAR	79

POPULAR NAME	NAME OF IMPOUNDMENT
	ACCORD POND

REGION	BASIN	RIVER OR STREAM	NEAREST DOWNSTREAM CITY–TOWN–VILLAGE	DIST FROM DAM (MI.)	POPULATION
01	06	ACCORD BROOK	HINGHAM	0	19544

TYPE OF DAM	YEAR COMPLETED	PURPOSES	STRUCTURAL HEIGHT (FT.)	HYDRAULIC HEIGHT (FT.)	IMPOUNDING CAPACITIES MAXIMUM (ACRE–FT.)	IMPOUNDING CAPACITIES NORMAL (ACRE–FT.)	DIST	OWN	FED R	PRV/FED	SCS A	VER/DATE
REPG	1890	S	10	10	985	845	NED	N	N	N	N	05MAR79

REMARKS
YEAR COMPLETED IS APPROXIMATE

D/S HAS	SPILLWAY CREST LENGTH	SPILLWAY TYPE	SPILLWAY WIDTH (FT.)	MAXIMUM DISCHARGE (FT.)	VOLUME OF DAM (CY)	POWER CAPACITY INSTALLED (MW)	POWER CAPACITY PROPOSED (MW)	NAVIGATION LOCKS NO	LENGTH (FT.)	WIDTH (FT.)	LENGTH (FT.)	WIDTH (FT.)	LENGTH (FT.)	WIDTH (FT.)	LENGTH (FT.)	WIDTH (FT.)
2	300	C	7	42	1500											

OWNER	ENGINEERING BY	CONSTRUCTION BY
HINGHAM WATER COMPANY		

REGULATORY AGENCY			
DESIGN	CONSTRUCTION	OPERATION	MAINTENANCE
NONE	NONE	NONE	NONE

INSPECTION BY	INSPECTION DATE DAY	MO	YR	AUTHORITY FOR INSPECTION
METCALF AND EDDY INC.	08	DEC	78	PUBLIC LAW 92-367

REMARKS